



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/731,356	12/09/2003	Bruno De Man	133642-1/YOD GERD:0068	4382
6147 7590 05/18/2007 GENERAL ELECTRIC COMPANY GLOBAL RESEARCH PATENT DOCKET RM. BLDG. K1-4A59 NISKAYUNA, NY 12309			EXAMINER CHU, RANDOLPH I	
			ART UNIT 2624	PAPER NUMBER
			MAIL DATE 05/18/2007	DELIVERY MODE PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/731,356	Applicant(s) MAN, BRUNO DE	
	Examiner Randolph Chu	Art Unit 2624	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 09 December 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-22 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1,2,7-14 and 18-22 is/are rejected.
- 7) ☒ Claim(s) 3-6, 15-17 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date <u>7/18/2005</u> | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Claim Objections

Claim 8 is objected to because of the following informalities:

Claim 8 does not end with period. Appropriate correction is required.

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

2. Claims 1, 2, 13, 14, 18-22 is/are rejected under 35 U.S.C. 102(b) as being anticipated by Man ("Iterative Reconstruction for Reduction of Metal Artifacts in Computed Tomography").

With respect to claim 1, Man teaches,
receiving measured sinogram data from the computed tomography system, the
sinogram data representative of a plurality of sinogram elements (pages 13-17);

reconstructing the measured sinogram data to generate initial reconstructed image data (pages 17-23);

identifying a trace of the high density object in the measured sinogram data (pages 82-84);

identifying a region of interest in the initial reconstructed image data (pages 82-84);

identifying an optimization criterion based upon the region of interest (pages 59-60);

iteratively adjusting the sinogram elements in the trace of the high density object in the measured sinogram data based upon the optimization criterion, to generate corrected sinogram data (Fig. 4.1; Pages 66-76, page 98); and

reconstructing the corrected sinogram data to generate improved reconstructed image data (page 98).

With respect to claim 2, Man teaches, the initial reconstructed image data is generated using a filtered back projection technique (pages 17-21).

With respect to claim 10, Man teaches, the optimization criterion comprises determining an optimal attenuation value associated with the region of interest (Fig. 3.8)

With respect to claim 11, Man teaches, wherein the optimization criterion comprises determining an optimal uniformity value associated with the region of interest

(page 105, 5th paragraph)

With respect to claim 12, Man teaches, the optimization criterion comprises minimizing angular variations associated with the region of interest based on the relative position of the region of interest with respect to the high density object (page 135, 3rd paragraph)

With respect to claim 13, Man teaches, reconstructing the corrected sinogram data to generate improved reconstructed image data comprises using a filtered back projection technique (pages 17-21).

With respect to claim 18, Man teaches,
an x-ray source configured to project an x-ray beam from a plurality of positions through the subject of interest (page 9);

a detector configured to produce a plurality of electrical signals corresponding to the x-ray beam (page 13); and

a processor configured to process the plurality of electrical signals to generate measured sinogram data, the sinogram data representative of a plurality of sinogram elements, wherein the processor is further configured to reconstruct the measured sinogram data to generate initial reconstructed image data (pages 13-23);

identify a trace of the high density object in the measured sinogram data (pages 82-84);

identify a region of interest in the initial reconstructed image data (pages 82-84);
identify an optimization criterion based upon the region of interest (pages 59-60);
iteratively adjust the sinogram elements in the trace of the high density object in
the measured sinogram based upon the optimization criterion, to generate corrected
sinogram data (Fig. 4.1; Pages 66-76, page 98); and
reconstruct the corrected sinogram data to generate improved reconstructed
image data (page 98).

With respect to claim 14, please refer to rejection for claim 1.

With respect to claim 19, please refer to rejection for claim 1.

With respect to claim 20, please refer to rejection for claim 1.

With respect to claim 21, please refer to rejection for claim 1.

With respect to claim 22, please refer to rejection for claim 1.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Art Unit: 2624

4. Claim 7 is rejected under 35 USC 103(a) as being unpatentable over Man ("Iterative Reconstruction for Reduction of Metal Artifacts in Computed Tomography") in view of Hsieh (US Patent 6,385,278).

Man teaches all the limitations of claim 1 as applied above from which claim 7 respectively depend.

Man does not teach expressly that identifying a region of interest is based on an attenuation value associated with the region of interest.

Hsieh teaches identifying a region of interest is based on an attenuation value associated with the region of interest (abstract).

At the time of the invention it would have been obvious to a person of ordinary skill in the art to identify a region of interest is based on an attenuation value associated with the region of interest in the method of Man.

The suggestion/motivation for doing so would have been that region of interest and non – region of interest should have significant difference in attenuation, so region of interest can be easily identified using attenuation.

Therefore, it would have been obvious to combine Hsieh with Man to obtain the invention as specified in claim 7.

5. Claim 8 is rejected under 35 USC 103(a) as being unpatentable over Man ("Iterative Reconstruction for Reduction of Metal Artifacts in Computed Tomography") in view of Luo (US 2004/0001569).

Man teaches all the limitations of claim 1 as applied above from which claim 8 respectively depend.

Man does not teach expressly that identifying a region of interest is based on a uniformity value associated with the region of interest.

Luo teaches identifying a region of interest is based on a uniformity value associated with the region of interest (para [0080]).

At the time of the invention it would have been obvious to a person of ordinary skill in the art to identify a region of interest is based on a uniformity value associated with the region of interest in the method of Man.

The suggestion/motivation for doing so would have been that region of interest and non – region of interest should have significant difference in uniformity, so region of interest can be easily identified using uniformity.

Therefore, it would have been obvious to combine Luo with Man to obtain the invention as specified in claim 8.

6. Claim 9 is rejected under 35 USC 103(a) as being unpatentable over Man ("Iterative Reconstruction for Reduction of Metal Artifacts in Computed Tomography") in view of Karimi et al. (US Patent 6,813,374).

Man teaches all the limitations of claim 1 as applied above from which claim 9 respectively depend.

Man does not teach expressly that identifying a region of interest is based on the relative position of the region of interest with respect to the high density object.

Karimi et al. teaches identifying a region of interest is based on the relative position of the region of interest (col. 11 lines 39-44).

At the time of the invention it would have been obvious to a person of ordinary skill in the art to identifying a region of interest is based on the relative position of the region of interest in the method of Man.

The suggestion/motivation for doing so would have been that region of interest is selected based on relative position so that calculation/manipulation of data is simplified.

Therefore, it would have been obvious to combine Karimi et al. with Man to obtain the invention as specified in claim 9.

Allowable Subject Matter

Claims 3-6 and 15-17 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

The following is an examiner's statement of reasons for allowance: claims 3 and 15-17 are allowable over the prior art of record because none of the prior art of record teaches the combined claimed elements as set forth in the claims 3 and 15-17.

None of the prior art of record teaches or fairly suggests that image processing method for that reducing artifact by computed topography system with assigning a reliability measure to each sonogram element where in iteratively adjusting the measured sinogram data is based upon the reliability measure or measured sinogram data relative to its position within the trace of the segmented high density object or based on a pre defined threshold value or based on an attenuation value of each sinogram element and together with combination of other claimed elements as set forth in the independent claims 3 and 15-17. Therefore, the claims 3 and 15-17 are over the prior art of records.

Conclusion

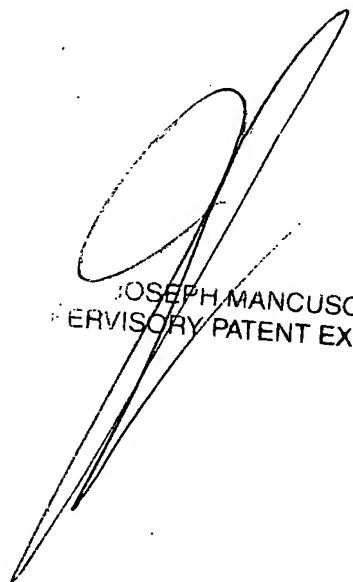
Any inquiry concerning this communication or earlier communications from the examiner should be directed to Randolph Chu whose telephone number is 571-270-1145. The examiner can normally be reached on Monday to Thursday from 7:30 am - 5 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Joseph Mancuso can be reached on 571-272-7695. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300. Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published

Art Unit: 2624

applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

RIC/



JOSEPH MANCUSO
SUPERVISORY PATENT EXAMINER